

AGRICULTURAL CHEMISTRY.

NO. 19.—ORGANIC CONSTITUENTS OF ANIMALS.

That a close relation must exist between the organic constituents of animals and the plants on which they subsist cannot for a moment be doubted by any one at all acquainted with the physical conditions of life. We find it must be evident to every one who becomes a thoughtful student, that we should expect to find the same elementary matters in the one as in the other; differing perhaps in the mode and mode of combination, but yet preserving a marked similarity of chemical composition. For, if we consider that the total increase in the structure of the animal, from the period of its birth to the last hour of its existence, is wholly due to the food it consumes; and that, in addition to this, there is a constant waste of material going on by the processes of respiration, and the wearing away of the surface of the body, which must be compensated from the same source; the conviction forces itself upon the mind that, however much animal and vegetable matter may differ in appearance and external character, when subjected to chemical analysis, they must be resolved into the same ultimate constituents.

Perhaps the bony parts of animals present fewer points of analogy than any other to what we observe in the class of vegetables. Yet although nothing approaching the outward form or chemical composition of bone can be found in the vegetable kingdom, the materials of which this substance is composed, even as regards its mineral constituents, form an important feature in the composition of most, if not all, of the plants used as food by animals. It is unnecessary to adduce further proof of what we have advanced, since the principle will be fully elucidated as we proceed.

Most animals are almost entirely composed of the four elementary substances so often alluded to, oxygen, hydrogen, carbon, and nitrogen, and these are, in like manner, grouped together to form various compounds.

The bodies of all living animals contain a considerable quantity of water, and when this is evaporated by heat, the substances of which they are composed, as they possess different properties, may be readily separated from each other in the same manner that we separate the various matters of which vegetables are composed.

The constituents of animals are also, in like manner, naturally divided into the organic matters which compose the softer parts of the body, and the earthy or inorganic substances which are bone.

Animal matter, for the most part, is rather more abundant than vegetable; and as nitrogen is a more abundant, as well as a more general characteristic of such substances, they are from this circumstance more liable to decompose.

The substances which constitute the living organs of animals are, however, principally derived from the combinations of the four elementary matters we have mentioned, and, above all, from albumen, gelatin, and fat or oil; they are called proximate animal principles. Besides these chemists have detected a multitude of other substances; but those enumerated are by far the most important, as constituting the bulk of animal matter.

Albumen is a white solid substance which, in a pure state, is nearly insoluble in water, but dissolves readily in weak alkaline solutions. It exists in the greater part of the animal system, and occurs in a state of solution in the blood, and many of the liquids and softer parts of animal bodies.

The white egg consists almost entirely of albumen, and when boiled it coagulates and becomes insoluble in water. When heated it burns, and the result of its decay as well as of its combustion are water, carbonic acid, and ammonia. It leaves a small quantity of white ash, which is principally phosphate of lime.

Gelatin is a white solid substance, derived from the animal skin, and consists principally of albumen.

It is in many respects, similar to albumen.

In chemical composition, they are nearly identical, consisting principally of the same elements, and combined in nearly the same proportions.

When pure it is a white, elastic substance, insoluble in water, but soluble in acid and alkaline solutions.

The muscle or flesh of animals consists principally of fibrin associated with albumen and gelatin; and it exists in a state of solution in the blood, from which it separates, after it has been withdrawn from the body, as a clot or coagulum.

The products of the combination of fibrin are similar to those of albumen, and the coagulum is a light-coloured sub, consisting chiefly of phosphates of lime and magnesia.

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Gelatin is insoluble in spirit, and in a perfectly dry state may be preserved unchanged for any length of time; but when moist or dissolved in water, it very soon passes into a state of putrefaction.

Preparations of gelatin are used as articles of food, and they are frequently employed in the preparation of jellies, soups, &c.

The result of experiments, made with a view to test its nutritive properties, seems to afford evidence rather of a negative character than otherwise; and its chief use, in a medical point of view, would appear to be that of an easily digestible substance, which may be made the vehicle by which food of a more nutritive character can be agreeably administered.

One of the most remarkable properties of this substance is its power for the absorption of water, and to a certain extent of oil.

When added to a solution of gelatin (one of gelatin) in water, we add a decoction of any aromatic herb containing tannin, an instantaneous precipitation of the gelatin occurs, and it is converted into leather, but of course in the state of powder. Thus, when the hides of animals from which the hair has been removed, and which consist almost entirely of gelatin, are left to steep in pits containing a decoction of oak-wattle, or other bark, the result is a leather.

The leather substance is gradually dissolved by and combines with the skin, forming an insoluble, elastic, and remarkably stable compound, which does not putrefy or ferment, and thus constitutes leather.

Casein is very closely resembles albumen in its properties and composition. It is insoluble in pure water, but readily dissolves in weak alkaline solutions.

Casein forms a considerable part of the milk of animals, and is found in a state of solution by the alkaline substances which are always found in fresh milk.

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